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Dear Sir/ Madam,

**Re: Response to First Written Opinion for PCT Application No. PCT/SG2004/000255**

**Applicant: Nanyang Polytechnic et al**  
**Title: System and Method for Detection and Location of Rogue**  
**Wireless Access Users in a Computer Network**  
**Authorized Officer: Maki Maryanovich**  
**Our ref: 1138.P040PCT/OCG**

We refer to the above-captioned PCT patent application and the First Written Opinion dated October 5, 2004.

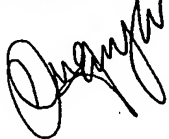
In response to the First Written Opinion, we enclose the following:

1. Response to Written Opinion (2 pages);
2. Replacement pages 16-19 (marked up pages); and
3. Replacement pages 16-19 (clean pages).

Please feel free to contact the below signed person for any matter related to the present application.

Yours sincerely

**LAWRENCE Y D HO & ASSOCIATES PTE LTD**



Ong Chin Gee

Encl.

## **Response to Written Opinion**

This is a response to the outstanding Written Opinion dated October 5, 2004 for the International application No. PCT/SG2004/000255, titled "System And Method For Detection And Location Of Rogue Wireless Access Users In A Computer Network".

There are twelve (12) claims pending in this patent application. Originally filed claims 1 and 2 have been combined into new claim 1; originally filed claims 9 and 14 combined into new claim 8; originally filed claims 3-8 renumbered to 2-7; originally filed claims 10-13 renumbered to 9-12; originally filed claims 2 and 14 are cancelled. Claims have been amended to better represent the claimed invention of the present application. No new matter has been added by the amendments.

Applicant gratefully notes that the originally filed claims 2-7 and 14 satisfy all requirements of patentability. As discussed above, the patentable subject matters have been incorporated into the newly amended claims. With respect to the objected claims, the Applicant respectfully submits that the amended claims have overcome all the objections in view of citations (a) WO 2003/083601 and (b) US 2003/0045270.

In the Written Opinion, the Examiner objects originally filed claims 9 and 13 for lack of novelty and inventive step in light of citation (a). Applicant has carefully reviewed citation (a) and dissents with the Examiner's objections. However, for the purpose of expediting the examination process, the Applicant has combined claims 9 and 14 into new claim 8. Since claim 14 is novel and inventive, new claim 8 that incorporates the subject matter of claim 9 and 14 is now novel and inventive. Accordingly, originally filed claim 13 (now renumbered to 12) that depends on new claim 8 is also novel and inventive.

The Examiner objects claims 1, 8 and 10-12 for lack of inventive step in view of citations (a) and (b). Applicant has carefully reviewed the combination of citations (a) and (b) and dissents with Examiner's objections. However, for the same purpose of expediting the examination process, the Applicant has combined claim 1 and 2 into new claim 1. Since claim 2 is inventive, new claim 1 that incorporates the subject matter of claim 1 and 2 is now inventive. Accordingly, originally filed claim 8 (now renumbered to 7) that depends on new claim 1 is also novel and inventive. Furthermore, originally filed claims 10-12 (now renumbered to 9-11) that depends on new claim 8, as discussed above, are also inventive.

The Examiner has observed that claim 9 lacks clarity in that it includes reference to "the algorithm of the present invention" and "without having the computer network's user having to be..." when there is no earlier establishment of these features. This language that is unclear has been cancelled.

Applicant respectfully submits that the pending claims 1-12 are novel and inventive. Therefore, a withdrawal of the objections is requested. Applicant respectfully submits that the present application is in condition for allowance.

**Claims**

1. A method to detect and geographically locate a rogue user wirelessly accessing a computer network, the method comprising:
  - a. deploying at least one Network Management System program;
  - b. pre-identifying at least one island in the wireless computer network;
  - c. mapping a geographical area covered by the wireless computer network into the at least one island;
  - e.d. measuring at least one network performance parameter for each island to obtain a spatial performance model;
  - d.e. deriving a performance index for each island based on the at least one performance parameter;
  - e.f. identifying a potential rogue user based at least on his Media Access Control (MAC) address and Internet Protocol (IP) address;
  - f.g. measuring at least one performance parameter of the potential rogue user;
  - g.h. deriving at least one performance index for the potential rogue user;
  - h.i. determining location of the potential rogue user by comparing the performance index of the potential rogue user with historical, average performance indices of each island pertinent to the current time of detection; and
  - i.j. effecting at least one network security measure against the rogue user.
- ~~2. A method further to Claim 1, the mapping further comprises pre-identifying at least one island.~~
32. A method further to Claim 1, the deriving at least one network performance index for each island further comprising:

- a. obtaining the differences between the captured values of the performance parameter of rogue user and the performance parameter in the spatial performance model;
- b. determining the minimum value for each difference;
- c. normalizing the values for each difference to obtain rank number; and
- d. summing the rank numbers for each island to obtain its performance index.

43. A method further to Claim 1, the deriving at least one network performance index for each island further comprising:

- a. determining the minimum values of each performance parameter in the spatial performance model;
- b. normalizing the values of each performance parameter in the spatial performance model and captured performance parameters of rogue user to obtain the rank numbers;
- c. obtaining the differences between the rank numbers of performance parameters in spatial performance model and the captured performance parameters of rogue user; and
- d. summing the differences for each island to obtain its performance index.

54. A method further to Claim 1 wherein the deriving of at least one performance index further comprising dynamically re-mapping the islands previously mapped based on the current performance index of each island at time intervals.

65. A method further to Claim 1 wherein the deriving of the performance index of the potential rogue user is substantially similar to the deriving of the performance index for each island.

76. A method further to Claim 1, the determining of the geographical location of the potential rogue user by comparing further comprising matching the performance indices of the at least one island with the performance index of the potential rogue user.
87. A method further to Claim 1, the effecting at least one network security measure further comprising:  
 logging particulars of the rogue user,  
 displaying geographically location of the rogue user,  
 denying access to the rogue user, and  
 prosecuting the rogue user.
98. A system to detect and geographically locate a rogue user wirelessly accessing a computer network, the system comprising:  
 a computer network with at least one wireless access point;  
 at least one processor;  
 at least a network management system;  
 at least one storage means; and  
~~at least one implementation of the algorithm of the present invention wherein the rogue user is able to be geographically located without having the computer network's user having to be physically in the vicinity of the rogue user.~~  
at least one implementation of an algorithm to geographically locate the rogue user by matching at least one network performance characteristic of the rogue user with at least one network performance characteristic of at least one pre-mapped island of the network around the at least one wireless access point.
409. A system according to Claim 98, the computer network further comprising wireless access points which are connected to the wired computer network.

- ~~44~~10. A system further to Claim 98, the at least one network management system further comprising at least one storage means further comprising storage of network performance parameter values, derived network performance characteristics and mapped islands covered by the at least one wireless access point.
- ~~42~~11. A system further to Claim 98, the at least one storage means further comprising storage of network performance parameter values, derived network performance characteristics and mapped islands covered by the at least one wireless access point.
- ~~43~~12. A system further to Claim 98, wherein the at least one storage means may be part of the at least one network management system.
- ~~14~~. ~~A system further to Claim 9, the at least one implementation of the algorithm of the present invention able to geographically locate the rogue user by matching at least one network performance characteristic of the rogue user with at least one network performance characteristic of at least one pre-mapped island of the network around the at least one wireless access point.~~

### Claims

1. A method to detect and geographically locate a rogue user wirelessly accessing a computer network, the method comprising:
  - a. deploying at least one Network Management System program;
  - b. pre-identifying at least one island in the wireless computer network;
  - c. mapping a geographical area covered by the wireless computer network into the at least one island;
  - d. measuring at least one network performance parameter for each island to obtain a spatial performance model;
  - e. deriving a performance index for each island based on the at least one performance parameter;
  - f. identifying a potential rogue user based at least on his Media Access Control (MAC) address and Internet Protocol (IP) address;
  - g. measuring at least one performance parameter of the potential rogue user;
  - h. deriving at least one performance index for the potential rogue user;
  - i. determining location of the potential rogue user by comparing the performance index of the potential rogue user with historical, average performance indices of each island pertinent to the current time of detection; and
  - j. effecting at least one network security measure against the rogue user.
  
2. A method further to Claim 1, the deriving at least one network performance index for each island further comprising:
  - a. obtaining the differences between the captured values of the performance parameter of rogue user and the performance parameter in the spatial performance model;
  - b. determining the minimum value for each difference;
  - c. normalizing the values for each difference to obtain rank number; and



- d. summing the rank numbers for each island to obtain its performance index.
3. A method further to Claim 1, the deriving at least one network performance index for each island further comprising:
- a. determining the minimum values of each performance parameter in the spatial performance model;
  - b. normalizing the values of each performance parameter in the spatial performance model and captured performance parameters of rogue user to obtain the rank numbers;
  - c. obtaining the differences between the rank numbers of performance parameters in spatial performance model and the captured performance parameters of rogue user; and
  - d. summing the differences for each island to obtain its performance index.
4. A method further to Claim 1 wherein the deriving of at least one performance index further comprising dynamically re-mapping the islands previously mapped based on the current performance index of each island at time intervals.
5. A method further to Claim 1 wherein the deriving of the performance index of the potential rogue user is substantially similar to the deriving of the performance index for each island.
6. A method further to Claim 1, the determining of the geographical location of the potential rogue user by comparing further comprising matching the performance indices of the at least one island with the performance index of the potential rogue user.

7. A method further to Claim 1, the effecting at least one network security measure further comprising:  
logging particulars of the rogue user,  
displaying geographically location of the rogue user,  
denying access to the rogue user, and  
prosecuting the rogue user.
8. A system to detect and geographically locate a rogue user wirelessly accessing a computer network, the system comprising:  
a computer network with at least one wireless access point;  
at least one processor;  
at least a network management system;  
at least one storage means; and  
  
at least one implementation of an algorithm to geographically locate the rogue user by matching at least one network performance characteristic of the rogue user with at least one network performance characteristic of at least one pre-mapped island of the network around the at least one wireless access point.
9. A system according to Claim 8, the computer network further comprising wireless access points which are connected to the wired computer network.
10. A system further to Claim 8, the at least one network management system further comprising at least one storage means further comprising storage of network performance parameter values, derived network performance characteristics and mapped islands covered by the at least one wireless access point.
11. A system further to Claim 8, the at least one storage means further comprising storage of network performance parameter values, derived

network performance characteristics and mapped islands covered by the at least one wireless access point.

12. A system further to Claim 8, wherein the at least one storage means may be part of the at least one network management system.